

REMARKS

Applicant thanks the Examiner for the Examiner's comments, which have greatly assisted Applicant in responding.

Preliminary Matter - New Claims based on Original Disclosure

As a preliminary matter, Applicant discusses hereinbelow particular amendments to the claims and newly added claims. Applicant submits that no new matter has been added thereto.

New independent claim 1 is based on pending independent claim 1 and further comprises the definitions of the pending dependent claim 5. Moreover, it has been clarified that at least one period value describing a time distance between two adjacent maxima is calculated, as disclosed, for example, on page 13, line 22 to page 14, line 8.

New independent claim 21 is based on pending independent claim 1 and has been adapted to be in parallel with new independent claim 1.

New independent claim 25 is based on pending independent claim 1 and also comprises the definitions of pending dependent claim 2. Moreover, it has been clarified that estimates of the time-varying concentration of the transmitter substance are analyzed (confer page 7, lines 1 to 15). In addition, it has been clarified that the rhythm analyzer is configured to select an inner hair cell which vibrates with a pitch frequency or a partial frequency (confer page 15, lines 25 to 31).

New dependent claim 26 defines that the rhythm analyzer is configured to make use of certain transmitter concentration envelopes identified by the pitch line to perform segmentation of the pitch line (confer page 7, lines 1 to 15 and page 15, lines 25 to 31).

New independent claim 27 is based on pending independent claim 21 and has been adapted to be in parallel with new independent claim 25.

Independent claim 28 is based on pending independent claim 1 and further comprises the definitions of pending dependent claim 17. Moreover, it has been defined that the timbre recognition module is configured to construct the feature vector such that the feature vector comprises feature values describing relations of frequencies of higher partials and the fundamental (confer page 32, lines 5 to 17).

New dependent claim 29 defines that the timbre recognition module is configured to construct the feature vector such that the feature vector comprises feature values describing differences between times at which cleft content envelopes of partials and a cleft content envelope of the fundamental reach maxima (confer page 31, line 29 to page 32, line 3).

New independent claim 30 is based on pending independent claim 21 and has been adapted to being parallel with new independent claim 28.

Applicant is of the opinion that the subject matter as defined by the new independent claims should be considered as being both new and inventive over the known prior art.

CLAIM REJECTIONS - 35 U.S.C. §102

Claims 1-3, 5-8, 21, 23-24 are rejected under 35 U.S.C. §102(b) as being anticipated by Ray Meddis ("Virtual pitch and phase sensitivity of a computer model of the auditory periphery. I: Pitch identification" - 1/24/1991) denoted as **Meddis '91**. Applicant respectfully traverses.

Regarding independent claim 1, the prior art is entirely silent about a vibration period detector which is operative, for each inner hair cell, to calculate at least one period value describing a time difference between two adjacent maxima in an estimate of a time-varying concentration of a transmitter substance, and to enter a resulting period value into a summary auto correlation function histogram.

Rather, MEDDIS 91, to which the Examiner refers to with respect to pending dependent claim 5, merely discloses to add a plurality of autocorrelograms, in order to obtain a summary auto correlation function (see Fig. 3C of MEDDIS 91). It should be appreciated that the superposition of the autocorrelograms is significantly different from the setup of a time histogram, into which a frequency of occurrence of different period values is entered.

Moreover, it should be appreciated that the computation of autocorrelograms and the addition of said autocorrelograms is much more computationally demanding than the entering of values describing time distances between adjacent maxima of the estimated inner hair cell cleft content into a histogram. Accordingly, the subject matter of the amended independent claim 1 should be considered as being novel and inventive over the known prior art.

The same arguments also apply to the amended independent claim 21.

Regarding the new independent claim 25, it should be appreciated that the prior art does not teach any rhythm analyzer for analyzing estimates of the time-varying concentration of the transmitter substance for selected inner hair cells, wherein the inner hair cells are selected in accordance with a pitch line, so that segmentation instances are obtained, wherein a segmentation instant indicates an end of a preceding node or a start of a succeeding node. MEDDIS 91 does not even relate to any rhythm analysis. Rather, MEDDIS 91 is merely related to a pitch analysis. As can be seen, part II of MEDDIS 91 is related to "pitch studies". Taking reference, for example, to section II.D of MEDDIS 91 titled "Musical Chords", it can be seen that MEDDIS 91 is completely silent about selecting any specific estimates of the time-varying concentration of the transmitter substance. First of all, MEDDIS 91 is not related to rhythm analysis. Secondly, when computing the summary auto correlation function, MEDDIS always uses autocorrelograms for all available hair cells. This can be seen, for example, in Fig. 13. Even if there are clearly distinguishable tones (like for the C-major triad) in the autocorrelograms for all of the inner hair cells (i.e., for all available channel center frequencies) are evaluated in order to obtain a summary auto correlation function.

CLARISSE also does not teach any rhythm analyzer for analyzing estimates of the time-varying concentration of the transmitter substance for selected inner hair cells, wherein the inner hair cells are selected in accordance with the

pitch line, so that segmentation instance are obtained, wherein a segmentation instant indicates an end of a preceding node or a start of a succeeding node. Rather, the segmentation algorithm disclosed in section 5.2 of CLARISSE is primarily based on the loudness function, whose deep minima are supposed to delimit the segments (section 5.2, second paragraph). In other words, CLARISSE teaches to use overall loudness (which is shown in Fig. 4) of an audio signal, rather than the time-varying concentration of the transmitter substance for one or more selected hair cells which are selected in accordance with the pitch line. Accordingly, the segmentation algorithm according to CLARISSE is not pitch-selective. Thus, a segmentation performed in accordance with the teachings of CLARISSE is typically less reliable than the rhythm analysis obtained in accordance with the teachings of the new independent claim 25.

Moreover, it is not apparent that SUMNER can contribute anything because SUMNER is merely related to details of the inner hair cell model.

Similarly, MEDDIS 1985 is merely related to details of the mechanical to neural transduction in the auditory receptor but not to any rhythm analysis.

Accordingly, it is believed that the subject matter of the new independent claim 25 should be considered as being both novel and inventive over the known prior art.

Regarding new independent claim 27, the same arguments also apply.

Regarding the new independent claim 28, it should be appreciated that the prior art is silent about any timbre recognition module which is operative for constructing a feature vector, feeding the feature vector into a pattern recognition device and obtaining a result indicating a probability that at least a portion of the sound signal has been produced by a sound source from a number of different specified sound sources, wherein the timbre recognition module is configured to construct the feature vector such that the feature vector comprises feature values describing relations of frequencies of higher partials and the fundamental.

Regarding the timbre analysis, the Examiner recognizes that MEDDIS does not disclose any timbre analyzer. However, CLARISSE, to which the Examiner refers, also does not comprise a timbre recognition module as defined by the new independent claim 28. In particular, CLARISSE is silent about analyzing a timbre to obtain a result indicating a probability that at least a portion of the sound signal has been produced by a sound source from a number of different specified sound sources. Moreover, CLARISSE is also completely silent about using a feature vector which comprises feature values describing relations of frequencies of higher partials and the fundamental.

However, in accordance with an embodiment of the invention, it has been found that said relations of frequencies of higher partials and the fundamental can be used to distinguish different musical instruments, because the frequency relationship between the fundamental and the higher partial differs for different musical instruments. The prior art is completely silent about such a concept.

In view of this situation, it is believed that the subject matter of the new independent claim 28 should be considered as being both new and inventive over the known prior art.

The same also holds for new independent claim 30.

Thus, in view of the above, removal of the rejections and reconsideration are respectfully requested.

CLAIM REJECTIONS - 35 U.S.C. § 103

a) Claim 4 is rejected under 35 U.S.C. §103(a) as being unpatentable over Ray Meddis ("Virtual pitch and phase sensitivity of a computer model of the auditory periphery. I: Pitch identification" - 1/24/1991) denoted as **Meddis '91** in view of Ray Meddis ("Simulation of mechanical to neural transduction in the auditory receptor" - 10/16/1985) denoted as **Meddis '85**. Applicant respectfully traverses.

Claim 4 depends directly from Claim 1 that has been discussed. Therefore, Claim 4 is deemed patentable for the reasons given above. In addition, Claim 4 separately introduces features that independently render the claim patentable. However, due to the fundamental differences already identified, and to expedite positive resolution of the examination, separate arguments are not provided for each of the dependent claims at this time. Removal of the rejection and reconsideration are respectfully requested.

b) Claims 9-11, 17-20 are rejected under 35 U.S.C. §103(a) as being unpatentable over Ray Meddis ("Virtual pitch and phase sensitivity of a computer model of the auditory periphery. I:

"Pitch identification" - 1/24/1991) denoted as **Meddis '91** in view of Clarisse et al. ("An Auditory Model Based Transcriber of Singing Sequences" - 2002) denoted as **Clarisse**. Applicant respectfully traverses.

The dependent claims depend directly or indirectly from the claims that have been discussed. Therefore, those claims are deemed patentable for the reasons given above. In addition, each of the dependent claims separately introduces features that independently render the claim patentable. However, due to the fundamental differences already identified, and to expedite positive resolution of the examination, separate arguments are not provided for each of the dependent claims at this time. Removal of the rejection and reconsideration are respectfully requested.

c) Claims 12-16 are rejected 35 U.S.C. §103(a) as being unpatentable over Ray Meddis ("Virtual pitch and phase sensitivity of a computer model of the auditory periphery. I: Pitch identification" - 1/24/1991) denoted as **Meddis '91** in view of Clarisse et al. ("An Auditory Model Based Transcriber of Singing Sequences" - 2002) denoted as **Clarisse** and Sumner et al. Applicant respectfully traverses.

The dependent claims depend directly or indirectly from the claims that have been discussed. Therefore, those claims are deemed patentable for the reasons given above. In addition, each of the dependent claims separately introduces features that independently render the claim patentable. However, due to the fundamental differences already identified, and to expedite positive resolution of the examination, separate arguments are not provided for each of the dependent claims

at this time. Removal of the rejection and reconsideration are respectfully requested.

CONCLUSION

Applicant respectfully posits that the pending claims are distinguished from the art of record, and that all rejections of the claims are overcome. Accordingly, Applicant respectfully requests allowance of all claims. The Examiner is invited and encouraged to contact Applicant's attorney or agent at (650) 474-8400 should any questions arise.

Respectfully submitted,

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